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PINE BEETLE HAZARD CONDITIONS
ON THE
SNOW MOUNTAIN AREA
OCHOCO AND MALHEUR NATIONAL FORESTS

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**PINE BEETLE HAZARD CONDITIONS
ON THE
SNOW MOUNTAIN AREA
OCHOCO AND MALHEUR NATIONAL FORESTS
REPORT NO. 1 - 1945 RISK CLASSIFICATION**

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INTRODUCTION

During the past fifteen years the western pine beetle - "enemy number one" of pine foresters and land-managing agencies - has "harvested" more commercially valuable ponderosa pine on the Snow Mountain Area of the Ochoco and Malheur National Forests than on any other single area in Oregon and Washington. Today, on many portions of this area the present stand is composed of young and immature trees, with few if any mature or over-mature trees remaining. On these portions, the ground is nearly covered with snags - the remnant of a once heavy stand of ponderosa pine. The Snow Mountain Area has been and still is a very critical area.

In order to assist the timber owners in combating the pine beetle problem, the personnel of the Portland Forest Insect Laboratory began a series of pine beetle hazard surveys on commercially important areas in Oregon in 1944. Two important working circles were surveyed in 1944. As a result of this field work, a workable system of making these surveys with a small crew was evolved. In 1945 a third important area - the Snow Mountain Area - was surveyed. Although Mr. H. E. Hulett, Forest Supervisor of the Ochoco National Forest had asked us to make this survey in October 1944 and to give an opinion as to the portions of the area most in need of immediate attention in order to avert further heavy depletion by pine beetles, it was not until the period of July 25 to August 17, 1945 that the writers were able to make the survey. On August 15, Mr. F. P. Keen assisted us in making a survey of that portion of the area within the boundaries of the Malheur National Forest in order to complete the picture for the areas as a whole.

This is a report of but one phase of the hazard survey of the Snow Mountain Area in which the ponderosa pine stands were rated according to the percentage of high risk trees now in the present stand. i.e. those most susceptible to pine beetle attack. It should be emphasized that the rating of trees according to risk is but one step or factor in any analysis of pine beetle hazard condition on a forested area. The primary purpose of this report is to present the data collected so that they can be of use to the Forest Supervisor as soon as possible. It is planned to make a second and more comprehensive report of pine beetle hazard conditions on the Snow Mountain Area during the winter, when more time will be available.

The writers wish to take this opportunity to thank the personnel of the Ochoco National Forest and the office of Timber Management of the Forest Service for the great help and courtesies extended during this survey. Without this cooperative assistance the survey would have taken much more time and would have been decidedly less effective.

DESCRIPTION OF THE AREA

As indicated the Snow Mountain Area is located on both the Ochoco and Malheur National Forests. With few exceptions its boundaries coincide with those of the Snow Mountain Working Circle established by the Forest Service. On the Ochoco National Forest the area includes the detached timberlands in the southeastern portion of the forest administered under the Allison Ranger District. On the Malheur National Forest, the area includes the drainages of Blue Creek, Sawtooth Creek and the headwaters and tributaries of the South Fork of the John Day River.

Most of the Snow Mountain Area lies above 5,000 feet elevation and over 95 percent of the timber volume is in ponderosa pine. According to the statistics from the Resource Survey of the Forest Service corrected to date, the acreage and volume of pine on the area at the present time are as follows:

	<u>Ochoco</u>	<u>Malheur</u>	<u>Total</u>
Acreage of ponderosa pine			
Virgin	216,000	53,000	269,000 acres
Cut-over	<u>3,000</u>	<u> </u>	<u>3,000</u> "
	219,000	53,000	272,000 "
Volume of ponderosa pine	1,960,000,000	325,239,000	2,185,239,000 bd. ft.

To date, all of the cutting on the area has been confined to privately owned stands within the boundaries of the National Forest; however, timber sales on federally owned lands are contemplated for the very near future.

BASIS FOR RATING STANDS ACCORDING TO PINE BEETLE HAZARD

According to present theories, the probability of pine beetle losses occurring in any ponderosa pine forest is dependent upon a number of factors, some of which are measurable and others unforeseeable. The more important factors fall into two groups: (1) those concerned with site, as determined by elevation, precipitation, temperature and soil conditions - which are more or less permanent in character, i.e. the losses are usually greater at low elevations in poor sites along the timber edge than in the good sites at higher elevations, and (2) those concerned with

the present timber stand conditions, whether the trees are young and thrifty and not subject to pine beetle attack or whether the trees are mature and stagnating and in a high risk condition. Current pine beetle hazard is the result of integrating these two sets of factors so as to predict the probable loss in the next 10 to 15 years.

The present report deals with the second set of factors, i.e. the percentage of high risk trees susceptible to insect attack now found on different parts of the area. It does not consider the impact of varying site conditions on such trees so as to make possible a prediction of the rate at which losses may occur in the future. A study of current growth rates shows a marked increase in growth since 1941 and as long as this condition prevails, the probability of heavy pine beetle damage is greatly reduced. Since no one can say how long this favorable condition may last, a rating of the present stand according to degree of risk is of interest in determining which areas need first attention from a timber management standpoint.

Four classes of risk or susceptibility to insect attack were recognized on the 1945 survey of the Snow Mountain Area. These classes and the colors used to prepare the risk map are as follows:

<u>Risk Class</u>	<u>Color</u>	<u>Percentage of High Risk Trees in Stand</u>
1	Blue	0 - 7 % of the stand
2	Green	8 - 13 % of the stand
3	Yellow	14 - 20 % of the stand
4	Red	Over 20 % of the stand

It should be pointed out that, in this survey, the green trees and the standing snags were tallied as number of stems on the strip without respect to board foot volume measurements. From the work on the Umatilla National Forest in 1944 it was observed that it made relatively little difference in the final rating of the area whether the data on the sample strips were recorded as individual stems above a certain diameter limit or by tallying the trees in two inch diameter classes, computing the volume of high and low risk trees, and then figuring the percentage of risk. It was found that the percentage of risk in the stand was only 2 or 3 percent higher than when the latter method was used. Because the tallying of individual trees was less time-consuming and gave a reliable interpretation of the susceptibility of the stand, this method was used on the Snow Mountain Area.

On August 14, Mr. Vondis Miller and Mr. Tom Spears of the Supervisor's office assisted us in testing these two methods on a chain-wide, half-mile long strip selected at random along the Cow Canyon road. A cruise of this strip was made in which the trees above 12 inches DBH were tallied as high or low risk trees in 2 inch diameter classes and 16-foot log lengths. The volumes were computed from a R-6 volume table. The following high risk percentages were obtained:

Percentage of stand in high risk by individual stems - 21.5%

Percentage of stand in high risk by volume 24.2%

The stand on this particular strip would be classified as "very high risk" by each method and that is exactly how it was classed at the time it was originally cruised.

Preparation of the Risk Map

At the end of each half mile, the car was stopped and the data on that half mile together with pertinent notes on stand conditions, etc. were recorded. The percentage of high risk on the strip was computed and entered on a vellum overlay sheet (placed over a 1/2 inch scale type map) according to the color of the risk class it represented. In many cases a mile or more of strip having the same risk rating was run before the map was colored but usually the map was colored at the end of each half-mile plot. In this way a map was built up and colored as the work progressed. This was a decided improvement over the system used in 1944 because the cruiser had the data before him and could rate the stand on the ground while his impression of the timber was still fresh in his mind.

OBJECTIVES OF THE SURVEY

The objectives of the 1945 survey on the Snow Mountain Area were:

- (1) To rate the stands of ponderosa pine on the area according to their risk or susceptibility to insect attack.
- (2) To obtain data on the severity of insect-caused losses during the past 10 to 12 years as represented by standing snags.
- (3) To zone the stands according to their relative hazard of pine beetle damage during the next 10 to 15 years.
- (4) To test the road-strip method of securing these data.

METHODS OF THE 1945 SURVEY

The methods used in making the 1945 survey on the Snow Mountain Area will be discussed in some detail in order to record the procedure we used for the benefit of subsequent surveys of this nature.

Method of Cruising

Because of the large number of main, secondary, salter's and hunter's roads found on the Snow Mountain Area, it is possible to collect all of the field data by the road-strip method of cruising. No ground strips were run since there was a relatively small percentage of the total area that could not be reached by a road of some description. For this work, we used a panel delivery truck; however, if we had been able to use a Jeep, it might have been possible to go into almost every section on the area.

One man drove the car (usually at a speed of from 5-7 miles per hour), recorded the cruising data, and kept a log for each strip. A 1.2 inch scale "fireman's map" was used to record the direction, distance, and number of all strips. Each strip was tied in as nearly as possible to a section line board or some prominent landmark. They were started at some convenient place - the edge of the timber, the forest boundary, a section line board, a road junction, etc. and were run as continuous strips on either side of the road until a natural break occurred.

The second man acted as timber cruiser. He rode on the right front fender of the car and recorded his data on three tally registers. (Mr. Buckhorn made a frame for the three registers so that they could be held and worked with one hand - an arrangement which proved to be very satisfactory and aided materially in this work). By riding outside, the cruiser had an unobstructed view of all trees on his strip and was able to examine any particular tree from more than one side.

Data Recorded

All green ponderosa pines above 12 inches DBH, except those in Keen's Age Class 1, falling within a strip one chain wide were tallied by the cruiser. All standing ponderosa pine snags on the same strip were also recorded. In this report, only the data for the green trees will be considered; however, the final report on hazard conditions on the area will consider past losses in their relation to future losses.

Pine Beetle Risk Classes

The green trees were recorded as either "low" or "high" risk and were rated according to Keen's penalty system of rating current tree thrift. Those trees having a penalty score of 0-4 points

were considered as low risk trees, while those with a penalty score of 5-16 points were tallied as high risk trees and are the type of trees that are considered most likely to die of insect attack should an epidemic develop.

ACCOMPLISHMENTS OF THE 1945 SURVEY

The accomplishments of the 1945 survey on the Snow Mountain Area by forests were as follows:

	<u>Ochoco N. F.</u>	<u>Malheur N. F.</u>	<u>Total</u>
Number of days of field work	14	1	15 days
Man-days of field work	28	3	31-man days
Miles of strip cruised	231	21	252 miles
Acres cruised per mile of strip	8	8	8 acres
Total acres cruised	1,848	168	2,016 acres
Percent of area cruised	0.85	0.32	0.74%
Number of snags tallied	6,453	399	6,853 snags
Number of trees tallied	42,926	3,698	46,624 trees
Miles of strip cruised per man-day	8.3	7.0	8.1 miles
Acres cruised per man-day	65.7	56.0	65.0 acres

Considering the size of the Snow Mountain Area (272,000 acres) it is believed that the sampling of 0.74 percent of the area, or 2,016 acres, has provided a satisfactory coverage of the area for a preliminary rating of risk and that the results of the survey can be used with a fair degree of confidence when applied to large blocks.

RESULTS OF THE 1945 SURVEY

The results of the 1945 survey to classify the stands of the Snow Mountain Area according to their risk from pine beetle attacks are best shown by color on the accompanying map. The total acreage of ponderosa pine in each of the four broad risk classes has been computed by counting the number of 40-acre squares in each section.

When these were totalled, by risk classes, the area was divided as follows:

<u>Risk Classes</u>	<u>Acreage</u>	<u>Percent of the Total</u>
Low Risk - 0-7% of the stand	67,000	24
Moderate Risk 8-13% of the stand	75,000	28
High Risk - 14-20% of the stand	89,000	33
Very High Risk - Over 20% of the stand	<u>41,000</u>	<u>15</u>
Total	272,000	100

In view of the past history of pine beetle activities on the Snow Mountain Area, it was not surprising to find that nearly half (48%) of the total acreage carried stands of high to very high risk. From the foresters standpoint, the areas where a very high percentage of the stand is at risk and shown in red, are the most important and need attention if future high losses are to be prevented.

Before discussing these critical portions of the area, two peculiarities in the procedure of risk rating a stand should be strongly emphasized. In rating a stand we are prone to two mistakes. We probably rate trees as being of very high risk that do not die within a given period, and at the same time we probably fail to recognize trees that will die before the end of a given period. It may well be that these mistakes compensate each other; however, at the present time it is quitelike that all of the trees classified as being of very high risk will not be attacked or die during the next 5 to 10 year period. Certain it is, however, that the portions of the Snow Mountain Area shown in red should be given prompt attention.

Blocks of Timber Needing First Attention

Two large blocks and six smaller blocks of very high risk timber were found during the survey. These will be discussed by forests in order of their importance as we see them:

On the Ochoco National Forest:

(1) The block around Dee Springs in T. 20-21 S., R 24-26 E. This block includes the stands in portions of the Delintment, Dodson, Sawmill, Rough, Nicoll and Morris Creek drainages. While the timber in this block may not be as tall as that in some of the other blocks, there is a high volume per acre tally which makes this the most critical portion of the area.

(2) The block east of Emigrant Butte and north of Green Butte in T. 20-21 S., R. 27-28 E. The timber in this block is generally of good quality and the volume per acre is high. While the past depletion of the stand by pine beetles has been high, there is still a good to fair stand of merchantable timber that should be utilized as soon as possible.

(3) The block south of Black Butte and west of Bear Canyon Butte in T. 19-20 S., R. 26-27 E. The timber in this block is of good quality and is adjacent to large blocks of lower risk timber.

(4) The block south of Bald Butte in T. 22 S., R. 28 E. This small block of very high risk timber is adjacent to an active logging operation on privately owned land within the national forest. If a light selection cutting could be made in the near future in conjunction with the present operation, a considerable volume of valuable timber would be saved.

(5) The block east of Bald Butte in T. 22 S., R. 28 E. This small block of very high risk timber lies just south of a cutover area of privately owned land. Another small operation inside the national forest could salvage the timber on this block.

(6) The block in the northwestern portion of the area in T. 18-29 S., R. 25 E. Because of the remoteness of this block of very high risk timber no practical suggestions are offered for its treatment.

On the Malheur National Forest

(1) The block near the Grant and Harney County lines in T. 18-19 S., R. 28 E. This is a small block of very high risk timber adjacent to a large block of high risk timber in the South Fork of the John Day River drainage. The area shown in red and yellow is large enough to be considered as a site for a portable mill operation.

(2) The block east of Emigrant Creek near the forest boundary in T. 19-20 S., R. 27-28 E. Most of this block of timber was burned in 1943 and consists of scattered stands of timber that for the next few years will remain as very high risk. If possible some salvage of this timber should be completed before it is rendered useless by attacks of insects and fungi.

For the present, the above areas of very high risk timber on the Snow Mountain Area are critical and need early consideration from a timber salvage and loss reduction standpoint. Portions of the area shown in yellow should be considered in conjunction with salvage operations on the critical areas.

The stands of the northern one-third of the Snow Mountain Area found to be of low or moderate risk and need not be considered at the present time.

RECOMMENDATIONS

Recommendations for the correct treatment of the ponderosa pine stands on the Snow Mountain Area are indeed difficult to make and involve many considerations from the economic, silvicultural and entomological standpoints. The writers offer the following suggestions for an action program on this area, largely from the pine beetle hazard standpoint.

In view of the behavior of past pine beetle epidemics, the severe depletion of the stands in many portions of the area, and the large blocks of high and very high risk timber on the area at the present time, it is felt that both light and heavy cutting or salvage and utilization operations should be instituted on a large portion of the area as soon as possible.

Naturally, the blocks of very high risk timber, shown on the risk map in red, should receive first consideration. Of these, the two large blocks, described above as numbers 1 and 2, should have priority. In the block around Doe Springs (number 1 above) some form of light selection cutting, probably a sanitation-salvage operation* should be initiated at once to be followed by a heavier cut in a few years. In the block east of Emigrant Butte (number 2 above) the past losses have so depleted the stands that a sanitation-salvage operation would amount to a utilization cut because it would remove most of the remaining merchantable trees on the block. The removal of the high risk element in these blocks by a sanitation-salvage operation would average approximately 21 percent of the trees and 25 percent of the board foot volume. In many cases it would be necessary to add a certain amount of "sweetening" in order to make up a cut equivalent to 25 percent of the stand volume; however, this is a matter for the Supervisor and the Office of Timber Management to decide.

*In referring to "sanitation-salvage operations", it is assumed that the reader is familiar with some of the research and studies leading to the formulation of this method of logging and some of the practical tests that have been made employing its principals. An article by Theo. J. Orr, Forester, Weyerhaeuser Timber Company, entitled "Reducing Pine Beetle Damage Through Partial Cutting" in West Coast Lumberman, April, 1942, gives a most interesting and thorough account of an actual sanitation-salvage operation. Reports in the files of the Portland and Berkeley Forest Insect Laboratories give the background for and the development of this idea as well as the results of annual surveys to follow the reduction in pine beetle losses on the areas so treated.

A sanitation-salvage operation in the block of very high risk timber south of Black Butte (number 3 above) would be of considerable value in protecting the surrounding blocks of low risk timber during the next few years.

As indicated, the small block of very high risk timber south of Bald Butte (number 4 above) is adjacent to an active logging operation. A sanitation-salvage cut could be made in this block while the company is still operating in the vicinity.

The blocks of very high risk timber east of Bald Butte and in the northeastern corner of the area are of small size and could probably best be handled through an arrangement with a small operator with a portable mill. In these blocks a sanitation-salvage operation would be very helpful in improving the vigor of the stand and salvaging much valuable timber.

As indicated above, the block of very high risk timber on the portion of the area in the Malheur National Forest east of Emigrant Creek is mostly of scattered timber that has been recently burned over. If possible this should be salvaged as soon as possible since it will remain as a threat to the surrounding area for probably the next two years.

A sanitation-salvage operation would be helpful in the small block of very high risk timber in the Belles Creek drainage on the Malheur portion of the area.

For the present, the above blocks of timber appear to be the critical portions of the Snow Mountain Area and some action should be taken in them as soon as possible in order to prevent useless depletion and to improve the thrift of the stands.

CONCLUSIONS

It is felt that the 1945 survey on the Snow Mountain Area has provided a satisfactory basis for indicating the portions of the area that are most in need of immediate attention. A little later it is planned to make a more complete report covering the pine beetle hazard conditions on this area in which the area will be considered not only from the timber stand conditions but from site and environmental pressure conditions as well and some estimate made as to probable future losses.

It is hoped that these data will be of some help in planning an action program for this important and interesting area.

PINE BEETLE RISK CLASSIFICATION

SNOW MOUNTAIN AREA
OCHOCO AND MALHEUR NATIONAL FORESTS
1945

LEGEND

- Low Risk — 0-7 % of the stand
- Moderate Risk — 8-13 % of the stand
- High Risk — 14-20 % of the stand
- Very High Risk — Over 20 % of the stand

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